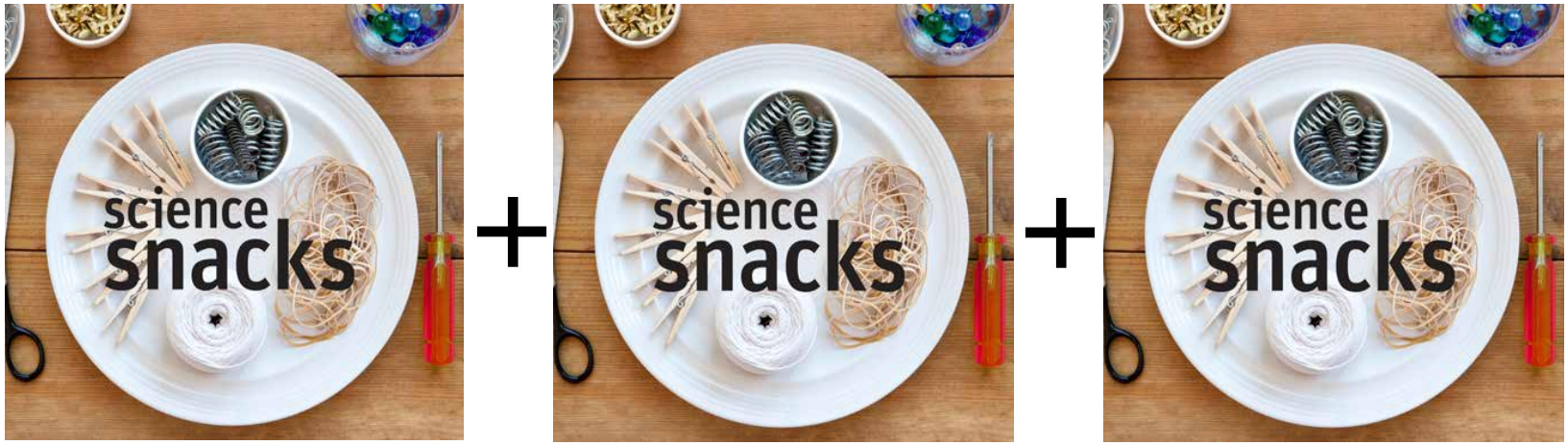

Creating Activity Sequences for NGSS

teacher institute

This planning tool is designed to help you create a sequence of classroom activities—whether you use Exploratorium Science Snacks, activities from other sources, or a mix of both—that engages students in gathering evidence to explain a phenomenon or answer a guiding question, as outlined in the Next Generation Science Standards (NGSS).

For more information about this planning tool and to see an example of an activity sequence, go to: https://www.exploratorium.edu/snacks/ngss

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Before you begin:

a. *Read through the entire tool.*
b. *Know your time constraints so you can choose the right depth and breadth of content for your sequence.*

As you move through the tool:

a. *Do each activity as you would teach it, and try to interact with the activity as a learner might.*
b. *Feel free to move to a different question if you get stuck, but be sure to come back to it later. These questions can be answered in a variety of orders.*
c. *Work with colleagues, if you can. They can help bring different perspectives.*

❶ What is the phenomenon or guiding question that will frame student learning for this unit?

For example, a guiding question for diffusion and osmosis might be, "How do materials move in and out of cells?" An example of a phenomenon might be water being released from salted vegetables.

❷ What science concepts do you think students will need to understand in order to answer the guiding question or explain the phenomenon? It may help to write out your own explanation or draw your own model of the phenomenon.

In the example above, students might need to understand how materials move up and down a concentration gradient, how a cell membrane regulates movement into and out of a cell, and how and why diffusion limits cell size. Note that each concept, with its associated investigation, will become part of your sequence of activities, so this is a good time to consider the number of activities you might want to take on.

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❸ Write each concept or underlying idea in one quadrant of an index card divided into four quadrants, as shown here. You will have one card for each concept you identified in question 2.

Science Concept	

❹ For each concept, identify an activity that could help build students' understanding of the topic. Record the activity you choose on your index card, as shown below.

At this point, focus on investigations rather than on readings or direct instruction. If a concept requires more than one activity, consider breaking the concept into smaller components. If an activity covers more than one concept, consider breaking it up into sub-activities that will help students make sense of the individual concepts.

Science Concept	
Activity	

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❺ For each activity, identify what you expect students to learn or what conclusions they may draw. Add your notes to the upper right quadrant, as shown below. Then, use the lower right quadrant to note some of the questions you think might arise for students during or after the activity.

If you need help, try using our Adapting an Activity for NGSS planning tool.

Science Concept	What will students learn?
Activity	What might students wonder?

❻ Now sort the cards into the order you think makes the most sense for student learning. Think about the following:

How can students' questions be leveraged to make connections between one activity and the next? Are there any concepts that students need to understand before learning others? Which activity would you place first? Consider an activity that raises more questions than it answers and might naturally lead to other activities, or use a real-world phenomenon that could kick off the sequence.

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❼ Additional things to consider:

a. What pedagogical supports or strategies will you need to add? Use blank index cards to add these to the sequence.

For example, where in the sequence would you support students in synthesizing what they have learned, help them evaluate and possibly revise their explanations, or build academic vocabulary? Where would you add new sources of information, such as readings or direct instruction?

b. Now look back at the guiding question or phenomenon you identified at the beginning of this process. Will students be able to use the evidence from their classroom investigations to answer the question or explain the phenomenon? If not, what other activities might you need to add?

c. Finally, look at your sequence as a whole. Are there any activities that do not contribute to students being able to answer the guiding question or explain the phenomenon? Can these be removed from the sequence?

As you move through this sequence with your students, note how they use evidence from each activity to make sense of the phenomenon, what additional supports they might need, and the questions they raise. Can you use this information to improve the sequence?

Other Resources:

- *For more information about this planning tool, go to: https://www.exploratorium.edu/snacks/ngss*
- *For free hands-on science activities, see our Science Snacks: https://www.exploratorium.edu/snacks*
- *To see a sample sequence on osmosis and diffusion: https://www.exploratorium.edu/snacks/instructional-sequences/osmosis*

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SEPA SCIENCE EDUCATION PARTNERSHIP AWARD
Supported by the National Institutes of Health

This work was supported by the Office of the Director, National Institutes of Health (NIH) under Science Education Partnership Award Number R25OD016525. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.